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ABSTRACT

Many scholars engaged in the study of human communication have indicated the need for a "process orientation" in theory and research. But relatively little work exists which has actually made use of the concept of process. This paper attempts to act as a guidebook to sources of information of potential use to the scholar interested in learning to deal with the concept in theory and research on communication. Included are both a general guide to sources and a specific guide to information on process in theory, design, measurement, and analysis. (Author)

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LEARNING TO DEAL WITH PROCESS IN THE STUDY OF COMMUNICATION: A GUIDE TO INFORMATION

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Many scholars engaged in the study of human communication would agree with Berlo (1960) in choosing the phrase, "the process of communication," to describe the focal point of the discipline. More specifically, in much of the discussion on the nature of communication, one finds these scholars agreeing that the concept of process is fundamental to the study of human communication, and calling for approaches to theory and research in this area which are "process-oriented" (Berlo, 1960, pp. 23-28; Bettinghaus, 1960, pp. 16-28; Chronkite, 1969, pp. 131-133; Krippendorff, 1970, pp. 258-267; Scheidel, 1971; Smith, 1971; among others). Indeed, one of the specific recommendations of the New Orleans Conference on Research and Instructional Development was to "...encourage research emphasizing the interactive, on-going, process nature of speech-communication (Kibler and Barker, 1969, p. 35)."

The scholars mentioned point to definite advantages to pursuing a knowledge of human communication using a "process orientation," as opposed to a "static viewpoint." In short, they note that theories and models incorporating the concept of process are more adequate representations of the phenomena of communication (cf. Berlo, 1960, pp. 23-28). Similarly, process oriented research would produce more adequate communication data and would make available a large class of otherwise nonobtainable information on how communication events begin, evolve, change, and terminate (cf. Krippendorff, 1970, pp. 258-267; Arundale, 1971, pp. 41-74). At the same time, however, it is evident that studying communication as a process is an extremely difficult task, regardless of whether one is constructing models or theories, or conducting research. This difficulty is reflected in the relatively small amount of theory, and especially of research, in communication which can be said to fully incorporate the concept of process (Arundale, 1971, pp. 55-71; Scheidel, 1971, p. 5). In fact, the disparity between the extensive discussion of the need for a process orientation, and its infrequent actualization in theory and research, has led some to paraphrase Mark Twain: "Everybody talks about process, but nobody does anything about it!" (Arundale, 1971, p. 71; Smith, 1971)

Rather than add to the quantity of talk by reiterating the calls for a "process approach" to the study of human communication, this paper attempts to indicate what has been done already which can be of use in doing something more about "process." That is, the paper attempts to organize the large array of information which is potentially relevant to the scholar who wants to learn to deal with the concept of process in the study of human communication. The result is a "guidebook" which indicates some of the "paths" a scholar might take, depending on his interests, in learning to do

something about the concept of process in his or her theory and research. No guidebook can describe all of the paths which all scholars might take, especially when there are so many diverse paths with potential relevance and utility. Accordingly, this paper will stop short of being an exhaustive bibliography, in favor of identifying useful directions or dimensions one might follow in gathering information on, advancing our knowledge of, or in short, learning about "process" in the study of communication.

Definitions. Most guidebooks attempt to describe only a limited "terrain," so that it is first necessary to identify what is included not only in the use of the term "process," but also in the use of the term "communication." Krippendorff has used the term "communication" to refer to "a process of transmission of structure among the parts of a system which are identifiable in time and space (1969, p. 107)," and this usage will be adopted here. As Krippendorff (1969, pp. 105-109) has indicated, his definition is considerably more general than some. However, it is an especially useful definition in dealing with the concept of process (Arundale, 1971, pp 18-25), and its generality will be of value here in suggesting several highly useful sources of information about the concept.

As is the case with the term "communication," one may also select from a number of definitions of the term "process." Here, too, a fairly general definition is valuable in that it will serve to enlarge the range of useful sources of information. Specifically, "process" will be used to refer to "All change over time of matter-energy or information... (J.G. Miller, 1965, p. 209)." Note especially that this definition centers on the phrase "change over time," a focus which will be reflected throughout this paper. That is, "change over time" is seen here as the critical attribute shared by those events which are to be labeled "process."

Other authors have defined the term "process" to include, in addition to "change over time," such key attributes as "interaction" and "multiple variables" (cf. Berlo, 1960, pp. 23-28, and Scheidel, 1971, p. 2). Indeed these two attributes can be seen to underlie the definition of "process," above, and especially the use of "process" in defining the term "communication." It is also the case, however, that approaches to dealing with interaction and multiple variables have been and are increasingly available, and that the greatest need at present is for approaches for dealing with change over time (Arundale, 1971, p. 42; Scheidel, 1971, p. 6). Accordingly, the predominant emphasis in this guidebook is on sources of information which are of value in helping scholars learn to deal with change over time, or process, in the study of communication.

A general guide. To begin with, it will be helpful to consider certain general characteristics of the broad "territory" encompassed in this guide. The purpose will be both to gain perspective before focussing sepcifically on the "area" of theory and research in human communication, and to examine what the adjacent areas of inquiry have to offer which is of value for dealing with process. Krippendorff (1969, p. 130) has developed a general "map" or "typology of inquiries into communication" which is particularly useful as a framework for organizing this general section of the guide to information about the concept of process. It is reproduced in Figure 1, and demands a brief discussion.

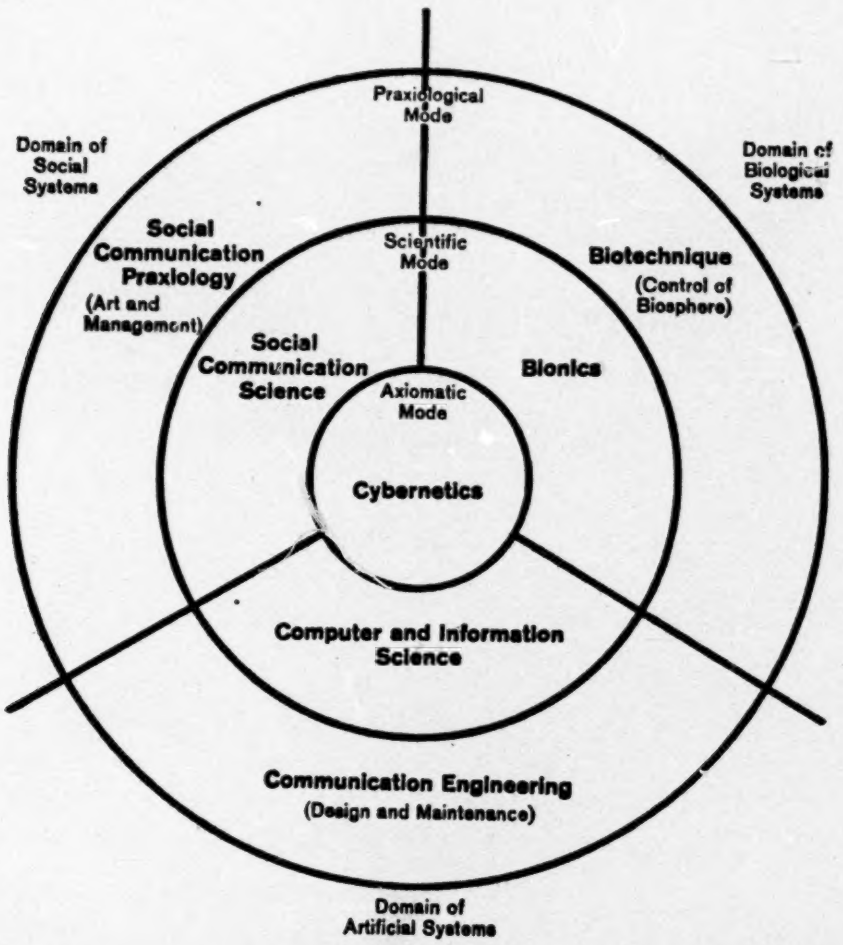

Figure 1: Map or typology of inquiries into communication (Krippendorff, 1969, p. 130).

Krippendorff's map or typology has two basic dimensions. The three rings radiating out from the center delimit three different modes, methods, or purposes of inquiry - the axiomatic, the scientific, and the praxiologic modes. The three spokes which divide the map delimit three different domains, contents, or subjects of inquiry: artificial, biological, and social systems.

Very briefly, Krippendorff (1969, pp. 114-122) notes that the praxiology of communication is concerned with the range of practical problems of communication, and seeks prescriptive policies or strategies leading to the control of some part of the environment, or to the attainment of a particular goal. The science of comunication differs somewhat in its concern with finding predictive theories or models of communication which have a basis in observable behavior. The important axiomatic mode of inquiry into communication "... has come to be identified with the term and body of knowledge provided by cybernetics (1969, p. 117)." The direct concern here is with developing internally consistent formal systems "of which all possible communication models are particular theorems (1969, p. 118)."

The high level of generality of the axiomatic mode of inquiry into communication is responsible for the central position of cybernetics in Figure 1, as well as for the fact that this "area" is not segmented into the three different domains of inquiry. The science and praxiology of communication, on the other hand, do take on somewhat different characteristics depending on whether the inquiry is focused on artificial, biological, or social systems. Scientific inquiry into artificial communication systems such as computers is identified in Figure 1 with the disciplines of computer and information science, while the praxiology related to such systems (eg. telephone networks) is commonly refered to as communication engineering. Biological communication systems encompass the relatively complex internal communication functions of isolatable living systems. Scientific inquiry into such communication functions is encompassed in the discipline of bionics, with the corresponding praxiology represented by the growing area of bio-engineering or biotechnique. Finally, the domain of social communication systems (eg., dyads, groups, organizations) is also subject to both the scientific and praxiologic modes of inquiry as represented in Figure 1. "Social communication praxiology," as Krippendorff terms it, covers the management of communication systems or the development and improvement of communication strategies to attain specific goals. Such praxiology at present may or may not draw on the discipline of "social communication science," which is concerned with developing predictive theories and models having their basis in the observable behavior of social communication systems.

The area of Krippendorff's map or typology which is of primary concern in this paper is this last area of social communication science. That is, the more specific section of the guide which follows is concerned entirely with indicating sources which a scholar might use in learning to deal with the concept of process in building theory and in doing research on social communication systems. But clearly this one area of scientific inquiry into human social communication cannot be isolated from other forms of inquiry into communication.

As Krippendorff's map suggests, social communication science is properly viewed as "surrounded"by other areas of inquiry, each of which can supply potentially valuable information to the scholar who is interested in learning to deal with the concept of process in theory and research.

While virtually all of the areas of inquiry represented in Figure 1 can supply some information which is of value, the four areas which share a "border" with social communication science appear to offer the most useful information on the concept of process. A few of the basic sources of information in the four areas of cybernetics, bionics, computer and information science, and social communication praxiology are considered below:

Cybernetics: Perhaps the most basic information here is the work of Ashby (1963) and the initial work of Wiener (1948). More recent work can be found in publications such as the IEEE Transactions on Systems, Man, and Cybernetics (formerly Systems Science and Cybernetics) and in the Communications of the American Society for Cybernetics. Somewhat apart from the area of cybernetics, per se, but of similar importance for work with communication systems, is the work in general systems theory of Bertalanffy (1968) and J.G. Miller (1965). An important source for both the areas of cybernetics and systems is the collection by Buckley (1968).

Bionics: Potentially relevant sources here are Gerardin (1968) and Milsum (1966). More specifically related to a system theory approach to biological systems is the work of J.G. Miller (1965, 1971, 1972).

Computer and Information Science: Many potentially relevant sources, represented in part by the work of Cherry (1957), Koenig, et al. (1967), Pierce (1961), and Shannon (1948). Additional more recent information can be found in publications such as Communications of the Association for Computing Machinery and Information and Control.

Social Communication Praxiology: An area not well developed but with potentially relevant information (from a systems theory perspective) represented by Adelson (1966), Banathy (1968), Gagné (1962), and Watzlawick, et al. (1967).

As noted earlier, this listing is not an exhaustive bibliography of sources of information for learning to deal with the concept of process. Rather, it is an indication of some key sources, each of which can be expected, in turn, to lead to additional sources.

A word of caution or warning is needed here. The sources of information considered above are each concerned with a specific mode or domain of inquiry which differs from that of social

communication science. Accordingly, one cannot expect to find specific discussions of how to deal with the concept of process in theory and research on human communication. Indeed, in areas such as bionics (eg. Milsum, 1966) the concept of process is so ubiquitious and has so long been taken for granted that one finds relatively little discussion of the concept per se. However, closer examination of the "terrain" discribed in these sources reveals rich veins of information which can be extremely valuable in learning to deal with the concept of process in the study of human communication.

A more specific guide. Given this overview of the broader "territory" encompassed in this guide, it is possible to focus specifically on the area of social communication science. The purpose here will be to direct the scholar to sources of information which will be of help to him or her in "doing something about" the concept of process in theory and research on human communication. No panecea is offered, for much work is yet to be done and many problems are yet to be solved in implementing a process oreintation in studying communication. Accordingly, some of the sources mentioned below will found to provide only very basic information -- information for beginning the work and the problem solving.

Given that the concern in this more specific section of the guide is with social communication science, it will be helpful to begin by sketching some general activities in scientific inquiry. The result will not be a model of how scientific inquiry actually procedes, but rather a statement of some basic activities which do eventually take place (cf. Kaplan, pp. 3-11 and passim). Many of the more subtle activities in scientific inquiry and the interrelationships among them will be omitted, since this sketch is intended only to serve as a framework for organizing this section of the guide. Figure 2 is a visualization of some of the general activities in inquiry, and requires a brief explanation.

In the actual practice of scientific inquiry, investigators choose many different points for beginning their work. It is sometimes helpful to assume, however, that inquiry begins when the investigator develops or selects a set of concepts, whether from his own observations of nature or from the work of others. He then relates these concepts to one another, or to existing structures of concepts, by establishing constitutive definitions (or linkages) among them. Such linking often involves considerable creative effort, and in the idealized case, results in a theory for the phenomena under study. From this theory or set of related concepts, the investigator derives hypotheses whose validity he attempts to test through controlled observations of nature.

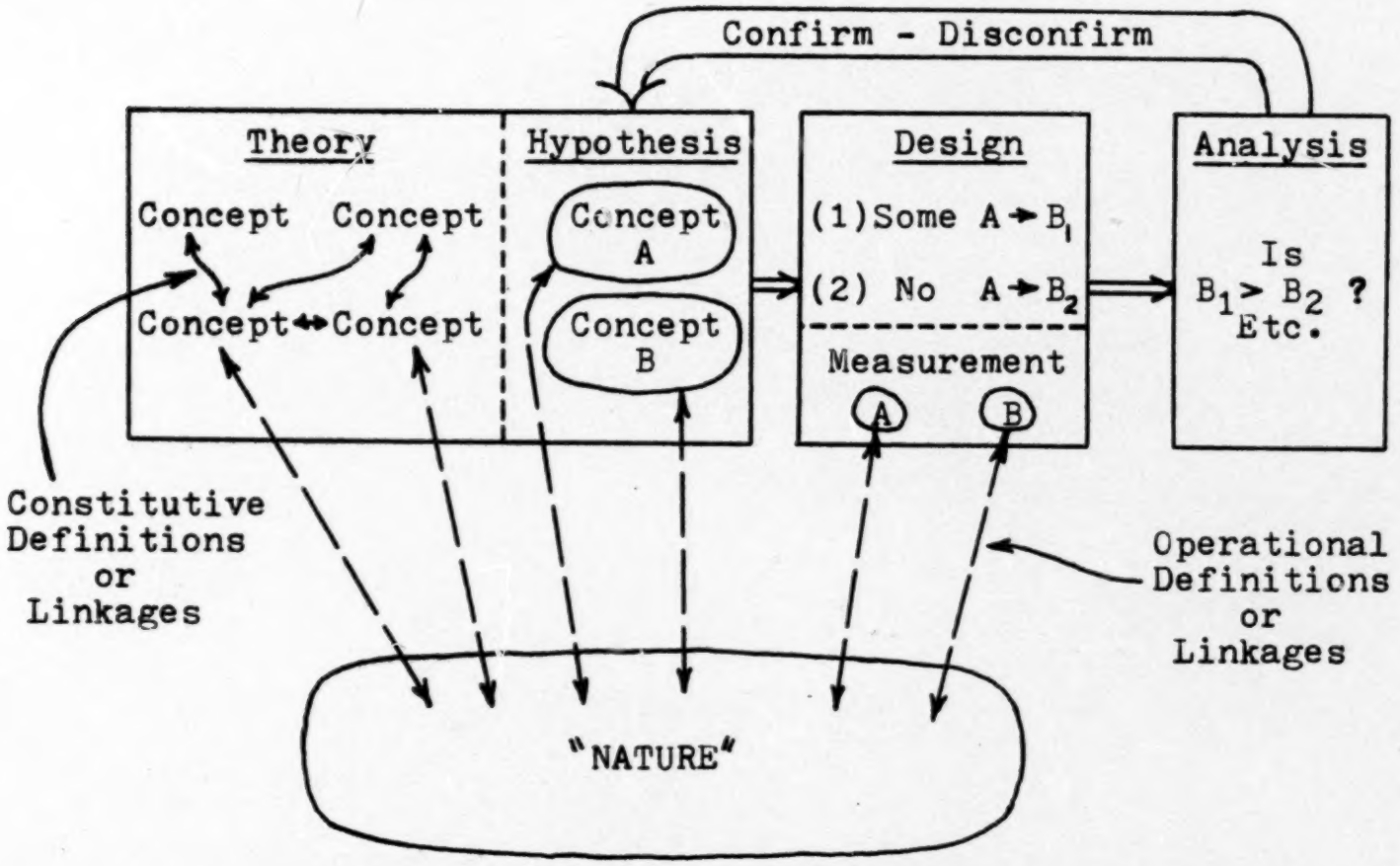

Figure 2: Key activities in scientific inquiry (after Berlo, 1967, p. 15).

To test his hypotheses, the investigator forms operational definitions of the concepts involved (say A & B in Figure 2), which specify the variables of concern to him. He then develops a design for his study in which he manipulates one variable (or set of variables and controls for factors which might confound the manipulation's effect on a second variable (or set of variables; see (1) & (2) on Figure 2). In developing the design, the investigator also selects or constructs some means of measurement for the variables under study. The data produced by the measurement procedure must also be both reduced and tested, and in doing so, the investigator often applies several different analysis procedures. It is on the basis of these analyses that he confirms or disconfirms his hypotheses and ultimately the theories from which they were derived (cf. Berlo, 1967).

Quite clearly, the progress of any particular scientific inquiry is seldom this straightforward or neatly structured. Yet the general activities of producing theory and hypotheses and of carrying out design, measurement, and analysis procedures are always present in some form and are basic to scientific inquiry. The scholar who is learning to deal with

the concept of process in the scientific study of human communication must be concerned eventually with each of these basic activities, and this more specific section of the guide to sources of information will be organized accordingly. This consideration of some of the activities basic to scientific inquiry does more, however, than simply provide an organizing framework. It suggests as well that the philosophy of science can be a useful source of information on the concept of process. In particular, the work of Fraser (1966), Reichenbach (1956; 1958), and Whitehead (1925, Ch. 7; 1929, Ch. 2,20) on the nature of time are especially important, as are the comments on "process" in theory and research to be found in Bergman (1966) and Kaplan (1964).

Such information from the philosophy of science is highly relevant, but is also quite general. The primary focus in this section of the guide, on the other hand, is on sources of information on the concept of process as it relates to the more specific activities of scientific inquiry into human communication. Each of the "four basic activities" noted above will therefore be examined briefly, with particular attention to some of the key sources of information for learning to deal with the concept of process in performing that activity. The four activities are considered separately, below, as a matter of convenience. Quite obviously one could not so clearly divorce one activity from another in any on-going inquiry.

Theory-hypothesis: As noted in the discussion of the general activities of scientific inquiry, the building of theory and/or hypotheses may be viewed as an establishing of constitutive definitions or linkages among new or existing concepts. A theory or hypothesis in the area of social communication science may be said to incorporate "process," or to have a process orientation, only if it includes the concept of process as one of its key concepts, and provides a full set of linkages to that concept. Such constitutive linkages may be either verbal or mathematical, and various approaches to establishing each type are considered at length in Arundale (1971, Ch. 3). Additional information relevant to incorporating the concept of process in theory and hypothesis may be found in Bellman (1965), Bertalanffy (1968), Blalock (1964), Coleman (1968), Daniel & Wood (1971), and Fararo (1969), all having a primary emphasis on mathematical approaches, as well as in Gerard (1968), Heirich (1964), J.G. Miller (1965), and Rappaport (1968), with primary emphasis on verbal appraches. The work of Krippendorff (1970), in particular, utilizes both approaches and has special relevance to the area of social communication science.

One implication of incorporating the concept process into theoretical structures in the area of social communication science is that theory building will have to depend less on "verbal" theory, as it does now, and more on "analogic" and

"symbolic" theory (Arundale, 1971, pp. 127-139). "Analogic" theory involves the representation of events under study by means of separate, "congruent" or "correspondent" structures (cf. Clarke, 1968, p. 33). Examples of such analogic theory which are relevant to human communication may be found in Gullahorn and Gullahorn (1965), Katzer (1970), and Stanfield, et al. (1965). "Symbolic" theory involves the representation of events by means of logical or mathematical notations and systems, and examples relevant to communication may be found in Jaffee and Feldstein (1970), Krippendorff (1971), and Simon (1957). Carroll and Farace (1968), in particular, consider both forms of theory with special reference to the area of social communication science and computer simulation.

Design: Once the investigator reaches the point in his scientific inquiry where he has formulated hypotheses, he will probably seek to test these through some form of controlled observation of nature. In doing so, he will have to devote some attention to the design of his study, in order that it yield adequate data. Of interest here are data which are adequate for drawing conclusions about "processes" represented in theory and hypotheses (cf. Krippendorff, 1970). In order to produce such data, a research design must operationalize the concept of process by meeting specific criteria for frequency and number of measurements over time (Arundale, 1971, pp. 142-153).

The implications of these requirements for operationalizing the concept of process are that more attention needs to be paid in research design to observation techniques, measurement intervals, the "resolving power" of designs, and overall periods of measurement (Arundale, 1971, pp. 156-164; see also Sidman (1960, passim)). It is also the case that only certain kinds of designs are capable of operationalizing the concept, and that more attention will have to be devoted to developing new designs. The work of Campbell and Stanley (1963), Tucker and Mack (1971), and of Wall (1970) is especially useful in this regard.

Measurement: Closely tied to the investigator's considerations of research design are the problems he faces in the measurement of variables (see Figure 2). Design and measurement considerations may even interact, as when a new, less cumbersome measurement technique permits the use of a more straightforward or better controlled design. The expanded use of designs which operationalize the concept of process, in particular, will depend on the further development of unobtrusive measurement techniques for many variables now in use. The work of Webb, et al. (1966) is especially valuable, here. In addition, new variables and new forms of operational definition of variables will be needed (Arundale, 1971, pp. 170-176), as will be advances in dealing with repeated measurements (see Campbell and Stanley, 1963, pp. 45-46; Harris, 1967, passim).

Analysis: Once the investigator collects his data, he faces the problem of analysis in order that he may extract the meaningful information from the data and provide the work of scientific inquiry with some closure. The data which are provided by research designs which operationalize the concept of process are unique only in that they contain a time dimension -- a dimension which must be preserved in the analysis if one is to use the results in confirming or disconfirming process oriented hypotheses. Because there are a great many potentially useful sources of information, here, a somewhat artificial distinction has been made in the Tables below between sources more relevant to the reduction of data and those more concerned with the testing of data (or more properly, of hypotheses). Table 1 presents brief descriptions of five general approaches to reducing data, while Table 2 presents six broad approaches to testing. Each individual approach is accompanied by a list of potentially relevant sources of information, and the emphasis throughout is on techniques which retain or deal with the time dimension present in the data.

Once again, the work of scientific inquiry in any area, and especially social communication science, does not fall into the form of neatly divided activities considered above. Such activities are basic to inquiry, though, and the attempt has been to suggest sources of information for learning to deal with the concept of process in performing those activities. Here, as before, the listing of sources does not comprise an exhaustive bibliography, but rather an indication of key sources which will in turn lead to others.

A word of caution or warning is appropriate here, as well. Wherever possible, the sources of information noted above are ones which refer to the problems of scientific inquiry into human communication; however, a clear majority of sources are concerned with different subjects or areas of investigation. Specific discussions of "how to apply technique X in human communication theory and research" are therefore often lacking. As a result, the terrain encompassed in the more specific section of the guide is often "rough" or "difficult" to negotiate, and is not without an occasional "cul de sac." But on the other hand, the territory is also so highly charged with information relevant to the concept of process, that the scholar cannot help but find something of value at almost every turn.

Such a discussion of sources of information useful in learning to deal with the concept of process would not be complete without reference to past research in the area of social communication science which has in some degree incorporated the concept. Several areas of research offer insights into the place of the concept in the study of human communication, among them the recent research into the nature of human communicative interaction, as represented by Frahm (1970), Harrison (1969),

Table 1. Reduction Techniques for Analysis of Data from Process Designs.

Technique and General Description[a]	References and Notes
Pattern Recognition Techniques for either identifying new patterns or seeking specified patterns in data. Patterns may exist in time or space, with temporal patterns (and data) of special interest here. Actually a broad area containing many techniques, some specifically adapted to certain types or classes of patterns and data.	General information: Uhr (1966, entire vol.) Comprehensive bibliography: Mason (1970) Discussion of techniques: Kanal (1968), Watanabe (1969) Note that journals such as the IEEE Transactions on Systems Science and Cybernetics or on Computers, as well as the Journal of the Pattern Recognition Society are also valuable sources of information.
Constraint Analysis Techniques, often closely related to pattern recognition techniques, for determining the bounds or constraints present in a given set of data. Again, the data may be temporal, spatial, etc., although temporal data, often termed "protocols" are of special interest here. Individual techniques vary, but are apt to be more generally applicable than many pattern recognition techniques.	General information with special reference to human communication: Krippendorff (1969b, pp. 24-32) General information: Ashby (1964) Potentially relevant sources on special aspects: Ashby (1963), Klir (1967), Shannon and McCarthy (1956)
Signal Analysis Techniques for deriving symbolic (mathematical) representations of temporal data or signals. Actually a broad area containing many different techniques.	General information: Gabor (1946), Koenig (1967, pp. 20-33), Milsum (1966, Ch. 3) Specific information on Fourier analysis: Bergland (1969), Bracewell (1965), Hamming (1966, Ch. 6) Basic information on statistical signals: Milsum (1966, Ch. 14)
Stochastic Processes Techniques for deriving a specific class of symbolic representations of data. Data are often temporal, and the representation differs from those above in that it describes the sequence or succession of individual data points.	General information: Bartlett (1966), Fanaro (1969), Parzen (1962), Snell (1965) Detailed information, especially with respect to spectral theory: Hannan (1960, Chs. 1-3), cf. Milsum (1966, Ch. 14) Detailed information with respect to multiple time series: Quenouille (1957, Chs. 1-6)
Trend Surface Analysis Techniques for deriving a symbolic representation of a trend or movement in a set of data or form of variation. Data are often spatial, but may be temporal. Actually a broad collection of techniques and may include regression analysis.	General information: Chorley and Haggett (1968), Clarke (1968, pp. 480-490), King (1969, pp. 152-154)

[a]No ranking or ordering of techniques is implied. The ordering is generally alphabetical, except for variations brought by relationships or similarities among the techniques.

Table 2. Testing Techniques for Analysis of Data from Process Designs.

Technique and General Description	References and Notes
Prediction Testing[a]	
Analysis of Variance: Analyses and tests of "change" or "time-curve" information by partitioning of variance.	Univariate procedures: Gaito and Wiley (1967) Multivariate procedures: Bock (1967)
Trend Analysis: Analyses and tests of the shape of the relation between two variables. Closely related to analysis of variance procedures.	General information: McNemar (1962, Ch. 17) Nonparametric trend analysis: Ferguson (1965) Related discussion with special reference to measurement: Sidman (1960, Ch. 10)
Goodness of Fit: Analyses and tests of the "fit" between two series of data (often the predicted and the observed).	General information: Carroll (1968, pp. 71-72), Jaffe (1970, pp. 83-84) Theoretical discussion: Hannan (1960, pp. 93-104)
Time Series Analysis: (a) Analyses and tests of serial correlation (autocorrelation), correlation, partial correlation, and regression between time series.	General information: Campbell (1967, pp. 224-229), Holtzman (1967), Quenouille (1952, Ch. 11) Detailed information: Bartlett (1966, Ch. 9), Quenouille (1957, Ch. 7)
(b) Analyses and tests with regard to stochastic processes.	Detailed information: Bartlett (1966, Ch. 8), Hannan (1960, Chs. 4-5)
Sequential Analyses: Analyses and tests where the number of observations required by the statistical procedure is not determined in advance.	General and detailed information: Wald (1947)
Performance Testing[a]	
Sensitivity Testing: A general approach to testing models in which parameters or relationships are systematically varied over successive "runs" of the model. The resulting differences in outcomes are compared to determine the sensitivity or "strength" of the model. Techniques are basically non-analytic.	General information: Carroll (1968, pp. 73-74), Lowry (1968, p. 62)
Response Analysis: A collection of mathematical techniques for manipulating models to examine characteristics of their operation. Includes analyses of stability or controllability as well as examination of outputs given specified inputs. Techniques are basically analytic.	General information: Carroll (1968, pp. 53-60) Detailed information: Koenig (1967, Chs. 5-7), Milsum (1966, Chs. 6-9, 11)

[a]No ranking or ordering of techniques is implied. The ordering is generally alphabetical, except for variations brought by relationships or similarities among the techniques.

and especially Hawes (1971). Two other areas of interest are the research into language behavior and development, as represented in the work of Brown & Bellugi (1964), Goldman Eisler (1968, Chs. 6 & 7), and Jaffee and Feldstein (1970), and the research into attitude change, as found in Brooks & Scheidel (1968), Hovland, Janis,, & Kelly (1953, Ch. 8), and Insko (1964). Note that these studies are included here as representative of research in human communication which has to some degree incorporated the concept of process. Other studies might well be included and a more complete summary may be found in Arundale (1971, pp. 62-69, and Ch. 5).

Conclusion and Implications for Learning. This brief list of studies which have incorporated the concept of process indicates that some scholars have begun to utilize a process orientation in studying human communication. Nevertheless, the amount of theory and research which is "process oriented" remains quite small in comparison to the total amount of theory and research which has been produced in the area of communication (Arundale, 1971, pp. 55-71; Scheidel, 1971, p. 5). In other words, it still appears accurate to say that "Everybody talks about process but (almost) nobody does anything about it!"

In an attempt to rectify this discrepancy between discussion and action, this paper has sought to indicate the work which has been done and which can be of use to scholars who want to "do something about" the concept of process in their theory and research. That is, the attempt has been to develop a "guidebook" to the large body of information which is potentially useful for learning to deal with the concept of process in the study of human communication. Note especially the use of the phrase "...potentially useful for learning to deal with the concept..." in the previous sentence, and throughout the paper. Such usage has been purposeful, for despite the seemingly large amount of information which is available on the concept of process, there is yet only little progress in sorting and integrating that information for the direct benefit of theory and research in human communication.

One immediate implication is that scholars concerned with incorporating the concept of process in their work will have to do much probing, culling, integrating, and above all, learning if they are to achieve their ends. That learning will not always be easy, for it will involve individual investigation of many diverse areas in search of answers to highly specific, problem-centered questions. In addition, many of the sources of information will be in "foreign" territories so that the scholar will have to learn new "languages" for theory and research in order to tap their potentials. At the very least, he will have to learn to work in harmony with the "natives" of these new areas in multi-disciplinary and interdisciplinary efforts.

An additional and less obvious implication of the present lack of sorted and integrated information is that it will be difficult in the near future to set up educational programs to introduce scholars (present and future) to techniques for dealing with the concept of process. Chronkite (1969, pp. 131-133) has noted that programs dealing with the concept of process are needed; however, a great deal more work must be done in culling and integrating the existing information, as well as in developing new techniques, before such programs can emerge. In addition, because there is a diversity of sources in this area, and no "great books," coherent programs and courses can emerge only in the light of clearly specified educational objectives. Said in a somewhat different way, this paper is only a guidebook to sources of information on the concept of process. As such it can describe the territory in a general fashion, but must stop short of laying out specific programs of study or "paths" for scholars to follow. If the traveler knows his objective or "destination," however, the information here will help him better find his way.

There is, then, much work to be done if one wishes to learn or to help others learn to deal with the concept of process in the study of human communication. The work will not be easy, since it will involve learning new approaches to developing theory and to carrying out research. Yet the returns for the effort should be high, for the theory and models which eventually result will be not only more adequate representations of the phenomena of human communication, but also more sound, given the more adequate communication data available to test them. To be fully adequate, of course, such communication theory must incorporate more than "just" the concept of process (cf. Arundale, 1971, pp. 221-226; Krippendorff, 1970; Scheidel, 1971, p. 2). But it is also the case that only as such process oriented theory (and research) begins to appear will we then begin to gain access to a potentially large and important class of information on communication, i.e., information on how human communication begins, evolves, and interacts during an event, or, in short, how it changes over time. Such information should greatly increase our knowledge and ability to learn about the nature of human communication (Arundale, 1971, pp. 41-74, 226-227; Kibler & Barker, 1969, p. 35; Scheidel, 1971, pp. 8-12; Smith, 1971).

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